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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---------------------------------|-------------|-----------------------|---------------------|------------------|
| 10/750,114 | 12/31/2003 | Charles Steven Korman | 132440-1 | 9588 |
| 6147 | 7590 | 04/18/2007 | EXAMINER | |
| GENERAL ELECTRIC COMPANY | | | HALL, ASHA J | |
| GLOBAL RESEARCH | | | | |
| PATENT DOCKET RM: BLDG. K1-4A59 | | | | |
| NISKAYUNA, NY 12309 | | | ART. UNIT | PAPER NUMBER |
| | | | 1709 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 04/18/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/750,114 | KORMAN ET AL. |
| | Examiner | Art Unit |
| | Asha Hall | 1709 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on ____.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) Claim(s) ____ is/are allowed.
- 6) Claim(s) 1-15 is/are rejected.
- 7) Claim(s) ____ is/are objected to.
- 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on ____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. ____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/31/2003
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____
- 5) Notice of Informal Patent Application
- 6) Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1,2,8,11,12, and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Brandhorst (3,989,541).

In regard to claims 1 and 2, Brandhorst discloses photovoltaic conversion/semiconductor layer (10) configured to produce an electrical current (col.3; lines: 60-63), when receiving photons on a first side of the photovoltaic conversion/semiconductor layer (10) in Figure 1. Brandhorst further discloses a thermally conductive layer (14) thermally coupled to a second side of the photovoltaic conversion/semiconductor layer (10); and a heat radiating layer (16) (anti-reflective coating) coupled to said thermally conductive layer (14) to radiate heat energy from the photovoltaic conversion/ semiconductor (20) layer.

With respect to claims 8,12, and 13, Brandhorst discloses a solar cell assembly and a method (col. 1; lines: 10-15) for controlling a temperature of a solar cell assembly used in an outer space environment/spacecraft (col.1; lines: 55-61). Brandhorst further discloses photovoltaic conversion/semiconductor layer (10) configured to produce an electrical current (col.3; lines: 60-63), when receiving photons on a first side of the

photovoltaic conversion/semiconductor layer (10) in Figure 1, and a second side is opposite the first side (Figure 1) to reduce temperature of the solar cell (col.3; lines: 8-10). Brandhorst continues to disclose that the solar cell (10) absorbs photons/incident solar radiation on the first side of said solar cell assembly (col.2; lines 57-61) and converts energy from a first portion of the photons into electrical energy (col.3; lines: 60-63). Also, Brandhorst discloses a reflective coating (14)(col.2; lines: 13-18) on the second side of the solar cell (10) that radiates excess heat energy away from the solar cell assembly (col.3; lines: 19-31).

With respect to claim 11, Brandhorst discloses that the first layer with an anti-reflective coating (16) on the first side of the photoconductive conversion/semiconductor layer (10) is constructed from a silicon compound selected from the group consisting of silicon oxides (col.4; lines: 4-5). Brandhurst teaches that the first layer (16) is for absorbing and radiating excess solar radiation, thereby reducing the temperature of the photovoltaic conversion/ semiconductor layer (col.3; lines: 19-21).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 3-5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandhorst (3,989,541), in view of Takeyama et al. (6,388,187).

With respect to claims 3,4, and 5, Brandhorst discloses photovoltaic conversion/semiconductor layer configured to produce an electrical current (col.3; lines: 60-63) as in claim 1, but fails to disclose that the thermally conductive layer is comprised of stainless steel and the black body radiating layer is comprised of chromium oxide.

Takeyama et al. discloses photovoltaic cell (Figure 2A), and further discloses that the thermally conductive layer (105) is constructed from a metal or a metal alloy comprised of stainless steel (col.6; lines: 37-41). Takeyama et al. also discloses a heat radiating layer/carbon black such as a black body coupled to said thermally conductive layer/foil (105) to radiate heat energy from said photovoltaic conversion/semiconductor (104) layer (col.9; lines: 58-66). Takeyama et al. teaches that radiating black body may also include chromium oxide (col.11; lines: 36-44). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate stainless steel as the metal and chromium oxide as the black body taught in Takeyama et al. to the photovoltaic conversion/semiconductor layer of Brandhorst, in order to have the black body absorb the heat while the metallic reflective layer radiates the heat away from the photovoltaic conversion/semiconductor layer.

With respect to claim 10, Brandhorst discloses photovoltaic conversion/semiconductor layer (10) configured to produce an electrical current (col.3;

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lines: 60-63) as in claim 8 above, but fails to disclose a first layer thickness greater than 10 μm .

Takeyama et al. discloses a photovoltaic conversion/semiconductor layer (104), and further discloses a first thickness (102) of 150 μm for supporting the entire photovoltaic element. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the first layer thickness greater than 10 μm taught in Takeyama et al. to the photovoltaic conversion/semiconductor layer of Brandhorst, in order to support the entire photovoltaic element.

5. Claims 6, 7,14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brandhorst (3,989,541) in view of Kubota et al. (5,807,440).

In regard to claims 6,7,14 and 15, Brandhorst discloses photovoltaic conversion/semiconductor layer (20) configured to produce an electrical current (col.3; lines: 60-63) as in claims 1 and 12 above, but fails to disclose a temperature wherein the photovoltaic conversion layer is maintained.

Kubota et al. discloses a photovoltaic conversion layer (Figure 1) and further discloses that the temperature of the photovoltaic conversion layer is maintained below 110°C by radiating heat (col.6, lines: 10-14), to avoid damaging the heat sensitive bonding agent (col.7; lines: 50-54). It would have been obvious to one of ordinary skill in the art at the time of the invention to maintain the temperature below 110°C taught in Kubota et al. to the photovoltaic conversion layer of Brandhorst, in order to avoid

damaging the heat sensitive bonding agent in the photovoltaic conversion/semiconductor layer.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brandhorst (3,989,541) in view of Chang et al. (5,405,680).

With respect to claim 9, Brandhorst discloses solar cell (10) assembly in Figure 1 has a first side/with anti-reflective coating (16), which transmits a portion of radiation (absorbs the heat) (col.3; lines: 59-61) in claim 8 above, but fails to disclose the first side with an emissivity level greater than or equal to 0.8.

Chang et al. discloses black body/ anti-reflective coating (16) for temperature reduction comprising a selective emissivity material with a high emissivity level substantially equal to one for radiation in the 8-13 μm wavelength region (col.11; line 24-25). Chang et al. teaches that the material is matched to the emissivity level that is responsive to that wavelength region (col. 11; lines: 26-31). It would have been obvious to one of ordinary skill in the art at the time of the invention to set the emissivity level of the anti-reflective coating greater than 0.8 taught in Chang et al. to the first side/coating of the photovoltaic conversion/semiconductor layer of Brandhorst, in order to match the wavelength region of the incident radiation.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asha Hall whose telephone number is 571-272-9812. The examiner can normally be reached on Monday-Friday 7:30-5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH

A.J.H.

Alex Neckel
ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER